

# COMPETENCY FRAMEWORK

## SURVEYOR

Surveyors Act 2003 s39

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V1.00	CF Taskforce	13 <sup>th</sup> Oct 2005	Released Document
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V5.00	SBQ	16 <sup>th</sup> April 2013	Board Approval
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## Document References

Ref	Title	Document ID	Version	Owner
[1]	Surveyors Act 2003			State of Qld
[2]	Competency Frameworks (Overview)	SBQ-CF-0100	V1.00	SBQ
[3]	Competency Frameworks (Surveying Associate)	SBQ-CF-0101	V4.00	SBQ
[4]	Competency Frameworks (Surveying Graduate)	SBQ-CF-0102	V4.10	SBQ
[5]	Competency Frameworks (Surveyor)	SBQ-CF-0103	V5.00	SBQ
[6]	Competency Frameworks (Consulting Endorsement)	SBQ-CF-0104	V1.00	SBQ
[7]	Competency Frameworks (Engineering Endorsement)	SBQ-CF-0105	V4.00	SBQ
[8]	Competency Frameworks (Cadastral Endorsement)	SBQ-CF-0106	V4.00	SBQ
[9]	Competency Frameworks (Hydrographic Endorsement)	SBQ-CF-0107 Superseded	V1.00	SBQ
[10]	Competency Frameworks (Mining Endorsement)	SBQ-CF-0108 Superseded	V3.00	SBQ
[11]	Competency Frameworks (Associate Degree Mapping)	SBQ-CF-0109 Superseded	V1.00	SBQ
[12]	Competency Frameworks (Graduate Degree Mapping)	SBQ-CF-0110 Superseded	V1.00	SBQ
[13]	Competency Frameworks (Surveyor Degree Mapping)	SBQ-CF-0111 Superseded	V1.00	SBQ
[14]	Competency Frameworks (Mining O Endorsement)	SBQ-CF-0112	V1.00	SBQ
[15]	Competency Frameworks (Mining UC Endorsement)	SBQ-CF-0113	V1.00	SBQ
[16]	Competency Frameworks (Mining UM Endorsement)	SBQ-CF-0114	V1.00	SBQ

## Introduction

This document describes the Competency Framework for registration as a Surveyor as prescribed under section 39 of the Surveyors Act 2003.

The competency framework describes the competency Units, Elements and Descriptors that are required to be met for registration as a surveyor. The competency framework describes the performance that the candidate is required to display. Competency is developed through the appropriate combination of qualifications, skills, knowledge and experience.

## Definitions

**Unit of Competency (Unit):** A major segment of the overall competency of a profession, typically representing a major function, role or field of activity.

**Element of Competency (Element):** A subdivision of a unit of competency into an observable function or activity.

**Performance Criteria (Descriptors):** An indicative list of the aspects of professional performance that would be regarded as evidence of competent professional performance in the work place in an element of competency.

**Notes:** The notes within framework are for guidance only and are not an official part of the framework. The notes are an aid to assist in the understanding of the requirement of a Unit, Element or Descriptor.

## Competency Table for Surveyor

Application of the framework

This competency framework reflects the competencies required for persons to obtain initial registration. In applying the framework throughout a registered person's career, it is recognised that it is not necessary to maintain the detailed technical competencies prescribed in parts of the framework. Where registered persons are not required to apply these technical competencies as part of their work duties, it is acceptable for them to be able to demonstrate that they have an understanding of the application of, and any limitations that may apply to the use of, these techniques.

The notes to the framework are for guidance only are not an official part of the framework. The Board can add to, amend or delete notes at their discretion.

### **Unit 1: Personal Qualities**

Element	Descriptors	Notes
S 1.1 Possess a tertiary qualification in surveying	Applicants will need to demonstrate that they: <ol style="list-style-type: none"> <li>i. Have completed a course of study of at least three years fulltime duration acceptable to the Surveyors Board of Queensland or have been previously registered as a Surveyor by the Surveyors Board of Queensland</li> </ol>	Board acceptability of courses of study is established by reference to the Competency Table for a Graduate Surveyor <a href="http://sbq.com.au/member/competency-frameworks/degree-mapping/">http://sbq.com.au/member/competency-frameworks/degree-mapping/</a>  See SBQ Policy – Competency Assessment & Registration <a href="http://sbq.com.au/member/board-publications/policies-guidelines/">http://sbq.com.au/member/board-publications/policies-guidelines/</a> s4(d) and s5(c) <ol style="list-style-type: none"> <li>i. USQ Bachelor of Spatial Science or a QUT Bachelor of Urban Development four year degree, or a USQ Bachelor of Spatial Science Technology three year degree are acceptable.</li> <li>ii. Degrees accredited by a Surveyors Board that is a member of the CRSBANZ are acceptable.</li> <li>iii. Overseas qualifications that have been assessed as equivalent to an Australian or New Zealand three year degree are acceptable.</li> </ol>

S 1.2 Are professional in their dealings with the public	Applicants will need to demonstrate that they: <ul style="list-style-type: none"> <li>i. Have not conducted themselves in a manner that erodes the public confidence in the profession</li> <li>ii. Have not been unfair or unethical in their dealings with the public</li> </ul>	An absence of contrary evidence will be sufficient evidence for this element. Applicants are obliged to reveal any matter related to their character, honesty and integrity which would affect their application.
S 1.3 Know and comply with published ethical codes	Applicants will need to demonstrate that they: <ul style="list-style-type: none"> <li>i. Understand and can explain the Surveyors Board of Queensland's Code of Practice for Surveyors</li> </ul>	Code of Practice for Surveyors <a href="http://sbq.com.au/member/board-publications/code-of-practice/">http://sbq.com.au/member/board-publications/code-of-practice/</a>
S 1.4 Keep their knowledge and skills current	Applicants will need to demonstrate that they have made themselves aware of changes in surveying practice through activities such as: <ul style="list-style-type: none"> <li>i. Attending continuing professional development events</li> <li>ii. Reading literature relevant to surveying practice</li> </ul>	
S 1.5 Know what limitations apply to their work	Applicants will need to demonstrate that they: <ul style="list-style-type: none"> <li>i. Can describe the regulation of surveying in Queensland</li> <li>ii. Have not undertaken work beyond limits of personal skills and expertise</li> </ul>	See Surveyors Act 2003 An absence of contrary evidence will be sufficient evidence for descriptor (ii). Applicants are obliged to reveal any matter related to their character, honesty and integrity which would affect their application.

### ***Unit 2: Collection of Data and Measurement***

Element	Descriptors	Notes
S 2.1 Collect data by measurement	Applicants will need to demonstrate that they: <ul style="list-style-type: none"> <li>i. Use adequate redundant measurements to validate data</li> <li>ii. Ensure measurements are legally traceable</li> <li>iii. Evaluate the various measurements methods and procedures available</li> <li>iv. Assess the effectiveness of the measurement method adopted</li> </ul>	Successful completion of EDME baseline comparison will be sufficient evidence for descriptor (ii).  Evidence of use of a variety of measurement methods in a variety of circumstances will be sufficient evidence for descriptor (iii & iv)

S 2.2 Search and acquire existing data	<p>Applicants will need to demonstrate that they are able to:</p> <ul style="list-style-type: none"> <li>i. Extract required information from relevant geographic and land information records, survey data bases, and general information depositories</li> </ul>	
S 2.3 Can use and maintain GNSS surveying instruments	<p>Applicants will need to demonstrate that they are able to:</p> <ul style="list-style-type: none"> <li>i. Define coordinates systems likely to be encountered by GNSS users and calculate GNSS coordinates</li> <li>ii. Discuss the principles of GNSS observations</li> <li>iii. Make observations using a GNSS receiver</li> <li>iv. Explain GNSS observations techniques, and calculate and evaluate levels of accuracy associated with GNSS observations</li> <li>v. Identify error sources in GNSS observations, and explain the uses and critical factors of differential GNSS techniques</li> <li>vi. Output GNSS observations in existing local co-ordinate systems including ground based systems</li> </ul>	
S 2.4 Apply quality assurance principles	<p>Applicants will need to demonstrate that they are able to:</p> <ul style="list-style-type: none"> <li>i. Comply with an accepted quality assurance program</li> <li>ii. Rectify non-compliance with quality standards</li> </ul>	

### ***Unit 3: Development Surveys***

Element	Descriptors	Notes
S 3.1 Setout minor works	<p>Applicants will need to demonstrate that they are able to :</p> <ul style="list-style-type: none"> <li>i. Read, interpret and understand design and construction plans</li> <li>ii. Set out works</li> </ul>	

	<ul style="list-style-type: none"> <li>iii. Communicate results to client, construction staff and other consultants</li> <li>iv. Use adequate redundant measurements to validate data</li> </ul>	
S 3.2 Perform topographic surveys	<p>Applicants will need to demonstrate that they have:</p> <ul style="list-style-type: none"> <li>i. Completed a variety of topographic surveys that were fit for purpose using terrestrial and GNSS instruments.</li> <li>ii. Use adequate redundant measurements to validate data</li> <li>iii. Accurately described the origin of datums and other explanatory notes</li> </ul>	<p>Descriptor (i) requires evidence that the applicant has completed detail surveys that:</p> <ul style="list-style-type: none"> <li>• Have an adjusted network of stations connected to a reference framework (e.g. co-ordinated control or cadastral marks);</li> <li>• Involve surveys of irregular surface levels and breaklines; and locating a range of artificial and natural features;</li> <li>• Require creation of a digital terrain model and contours;</li> <li>• Require compilation of supplementary data from other sources (e.g. plotting underground services from records);</li> <li>• Generate output formats (e.g. digital files, PDF) to suit the project brief and demonstrates understanding of design requirements.</li> </ul>
S 3.3 Survey and calculate volumes and quantities	<p>Applicants will need to demonstrate that they:</p> <ul style="list-style-type: none"> <li>i. Collect topographic data at appropriate accuracy and density for volume purpose</li> <li>ii. Calculate and report volumes to an accuracy justified by the measurement method</li> </ul>	
S 3.4 Know and apply occupational health and safety requirements	<p>Applicants will need to demonstrate that they:</p> <ul style="list-style-type: none"> <li>i. Can describe the requirements of occupational health and safety legislation in Queensland that is pertinent to their work environment</li> <li>ii. Use occupational health and safety procedures that comply with the relevant legislation</li> </ul>	<p>See Coal Mining Safety and Health Act 1999 Mining and Quarrying Safety and Health Act 1999 Work Health and Safety Act 2011, Transport &amp; Operation Act (Road Use Management) 1995 (as a way of explanation, it refers to the Manual for</p>

Uniform Traffic Control Devices which is required when placing any traffic sign on a public road)

#### **Unit 4: Process Field Measurements**

Element	Descriptors	Notes
S 4.1 Can detect errors in existing data and field observations.	Applicants will need to demonstrate that they are able to: <ol style="list-style-type: none"> <li>i. Identify errors in data that is supplied by other parties</li> <li>ii. Use quality assurance processes to ensure that errors are detected and eliminated</li> </ol>	
S 4.2 Understands the accuracy of existing data and creates new data with appropriate accuracy.	Applicants will need to demonstrate that they are able to: <ol style="list-style-type: none"> <li>i. Determine the accuracy and reliability of data</li> <li>ii. Define the limitations of collected data</li> </ol>	Descriptor i requires an assessment of data that may be influenced by the knowledge of its age, what equipment was or may have been used, what was the purpose of collecting it, datums and control used etc. Descriptor ii requires an understanding of the limitations of equipment and methods used and accuracies required for the task at hand.
S 4.3 Can combine existing data with new survey data	Applicants will need to demonstrate that they: <ol style="list-style-type: none"> <li>i. Are able to deduce or estimate the accuracy limitations of existing data sets</li> <li>ii. Do not use data sources of insufficient accuracy in survey products</li> </ol>	
S 4.4 Can produce plans that are accurate, legible and useful	Applicants will need to demonstrate that they are able to: <ol style="list-style-type: none"> <li>i. Use a computer aided drafting package to produce paper plans</li> <li>ii. Produce sketches that are fit for purpose</li> </ol>	Descriptor (ii) requires evidence that the applicant produces plans for set out operations that accurately and unambiguously identify the marks placed and their relation to works to be constructed.
S 4.5 Can produce electronic models and plans	Applicants will need to demonstrate that they are able to: <ol style="list-style-type: none"> <li>i. Use a computer aided drafting package to produce electronic plans</li> <li>ii. Create digital models of physical surfaces</li> </ol>	Descriptor (i) requires evidence that the applicant produces plans where the plan information is accurately and unambiguously ordered to prevent misinterpretation by other parties.



- iii. Attach attribute information to a digital model
- iv. Transfer files between various formats

### **Unit 5: Communication**

Element	Descriptors	Notes
S 5.1 Communicate effectively	Applicants will need to demonstrate that they are able to: <ul style="list-style-type: none"> <li>i. Communicate effectively, orally and in writing</li> <li>ii. Issue clear, accurate instructions to subordinates</li> <li>iii. Successfully use electronic communications technologies</li> </ul>	
S 5.2 Can speak effectively at meetings	Applicants will need to demonstrate that they are able to: <ul style="list-style-type: none"> <li>i. Explain surveying matters in comprehensible and unambiguous language at small meetings of allied professions</li> </ul>	
S 5.3 Prepare reports	Applicants will need to demonstrate that they are able to: <ul style="list-style-type: none"> <li>i. Prepare logical and coherent reports for the benefit of surveyors, other professions and clients</li> </ul>	
S 5.4 Certify data	Applicants will need to demonstrate that they are able to: <ul style="list-style-type: none"> <li>i. Write certificates that are accurate and limited to areas of their professional competence</li> </ul>	When called upon will be able to: <ul style="list-style-type: none"> <li>i. Understand and explain the accuracy and reliability of data to be certified.</li> <li>ii. Understand and explain the responsibilities of data certification.</li> <li>iii. Apply effective validation procedures.</li> <li>iv. Effectively identify and manage risk associated with certification</li> </ul>
S 5.5 Provide advisory services	Applicants will need to demonstrate that they are able to: <ul style="list-style-type: none"> <li>i. Provide sound advice to clients and fellow professionals on surveying and land management matters at an appropriate level of detail.</li> </ul>	

**Unit 6: Survey Control**

Element	Descriptors	Notes
S 6.1 Use geodetic reference systems	<p>Applicants will need to demonstrate that they are able to:</p> <ul style="list-style-type: none"> <li>i. Use appropriate geodetic datums and map projections</li> <li>ii. Perform geodetic calculations of traverses and intersections using geographic coordinates</li> <li>iii. Perform geodetic calculations of traverses and intersections using UTM grid coordinates</li> <li>iv. Transform three dimensional coordinates between systems and between datums, with the aid of suitable software, to the required level of accuracy</li> </ul>	
S 6.2 Integrate survey control	<p>Applicants will need to demonstrate that they are able to:</p> <ul style="list-style-type: none"> <li>i. Describe and comply with the regulation of surveying and mapping infrastructure in Queensland</li> <li>ii. Find and recognise evidence of previous surveys</li> </ul>	<p>See Survey and Mapping Infrastructure Act 2003</p> <p>Descriptor (ii) refers to evidence of previous cadastral, engineering and mining surveys.</p>
S 6.3 Establish, measure and adjust horizontal survey control	<p>Applicants will need to demonstrate that they are able to:</p> <ul style="list-style-type: none"> <li>i. Establish project control networks using GNSS and terrestrial measurements</li> <li>ii. Evaluate and adjust measurements by appropriate adjustment methods</li> <li>iii. Use adequate redundant measurements to validate data</li> <li>iv. Mathematically adjust survey networks by the method of least squares using computer software packages</li> <li>v. Analyse and critically evaluate the adjustment</li> </ul>	<p>Descriptor (ii) refers to knowledge of the assumptions inherent in the adjustment methods available.</p>

<p>S 6.4 Establish, measure and adjust vertical survey control</p>	<p>Applicants will need to demonstrate that they are able to:</p> <ul style="list-style-type: none"><li>i. Perform precise level measurements</li><li>ii. Identify the effects of curvature and refraction on levelling and apply this knowledge to trigonometrical levelling</li><li>iii. Identify the equipment and methods used in precise levelling and the sources of error and the techniques to minimise their effects</li></ul>	
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